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September 1960

Technical Publication

CAMERA INFORMATION FOR KEYHOLE MISSION 9009

PIC/TP-5/60

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CAMERA INFORMATION

FOR KEYHOLE MISSION 9009

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CAMERA INFORMATION FOR KEYHOLE MISSION 9009

This publication presents the technical information necessary for the reduction of quantitative data obtained from photography of Mission 9009. It is planned that a similar publication will be prepared for each future mission. This photography involves the use of three cameras: a main camera, a port horizon camera, and a starboard horizon camera. Three illustrations (Figures 1, 2, and 3) are included as pictorial supplements to the information in the text. The dimensions shown on Figure 3 may be used for film-shrinkage studies. The sign convention used is that in which the nadir offset will be provided.

1. Operational Focal Lengths

A.	Main lens	23.989 inches
B.	Port horizon lens	89.30 mm
C.	Starboard horizon lens	90.35 mm

Definition: "Operational focal length" is defined as the distance from the main lens nodal point to the film plane as measured on the lens bench, and the data reduced for a vacuum condition. (Operational focal length is equivalent focal length corrected for environment.)

2. Lens Distortion

A. Main lens -- at 3° radial, plus 0.012 mm.

B. Port horizon lens -- at 10° radial, .000 mm; at 20° radial, plus .009 mm.

C. Starboard horizon lens -- at 10° radial, .000 mm; at 20° radial, plus .003 mm.

3. Depression Angle of Horizon Cameras

A.	Port horizon camera	14° 52'
B.	Starboard horizon camera	15° 00'

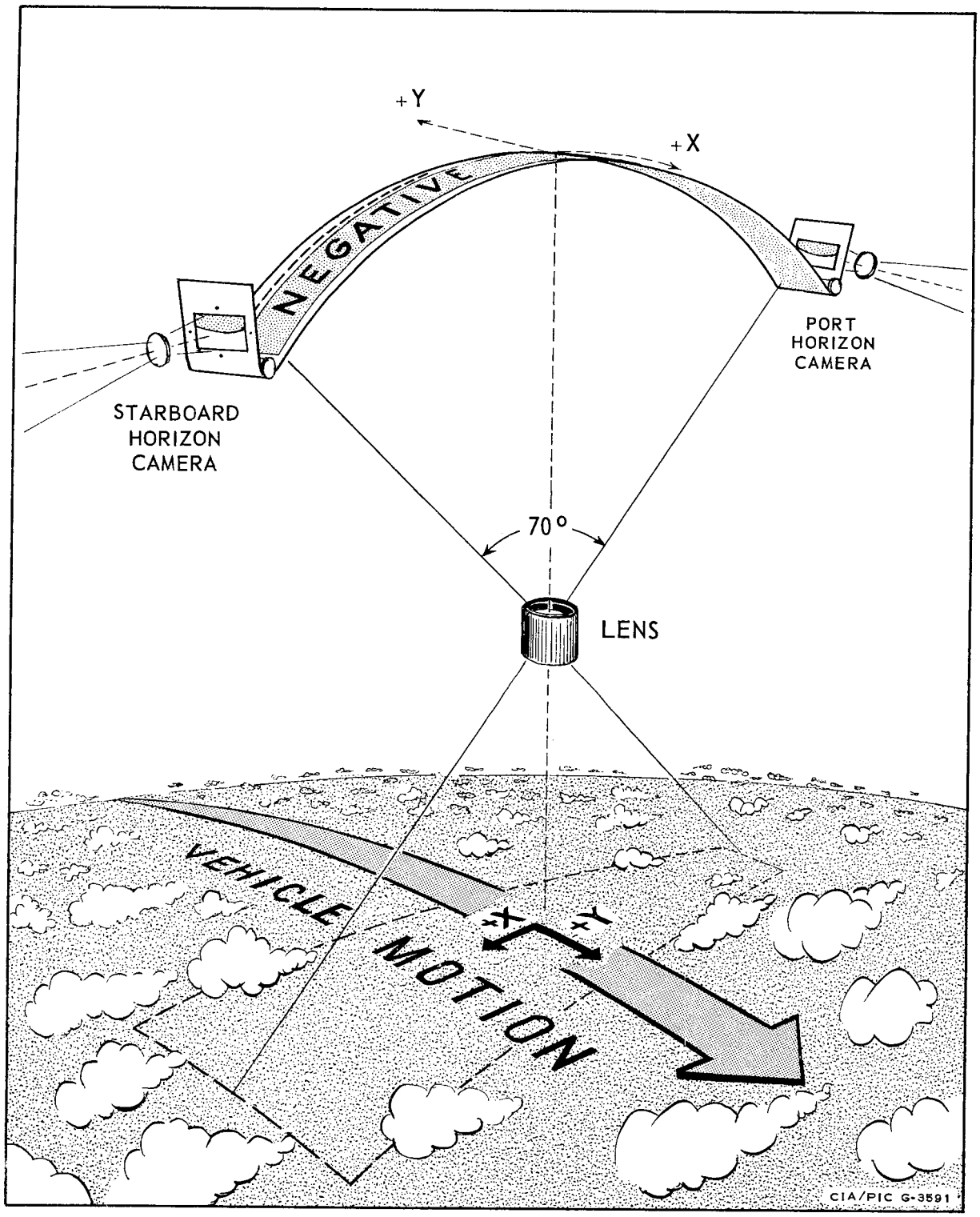

FIGURE 1. PICTORIAL DIAGRAM OF SYSTEM

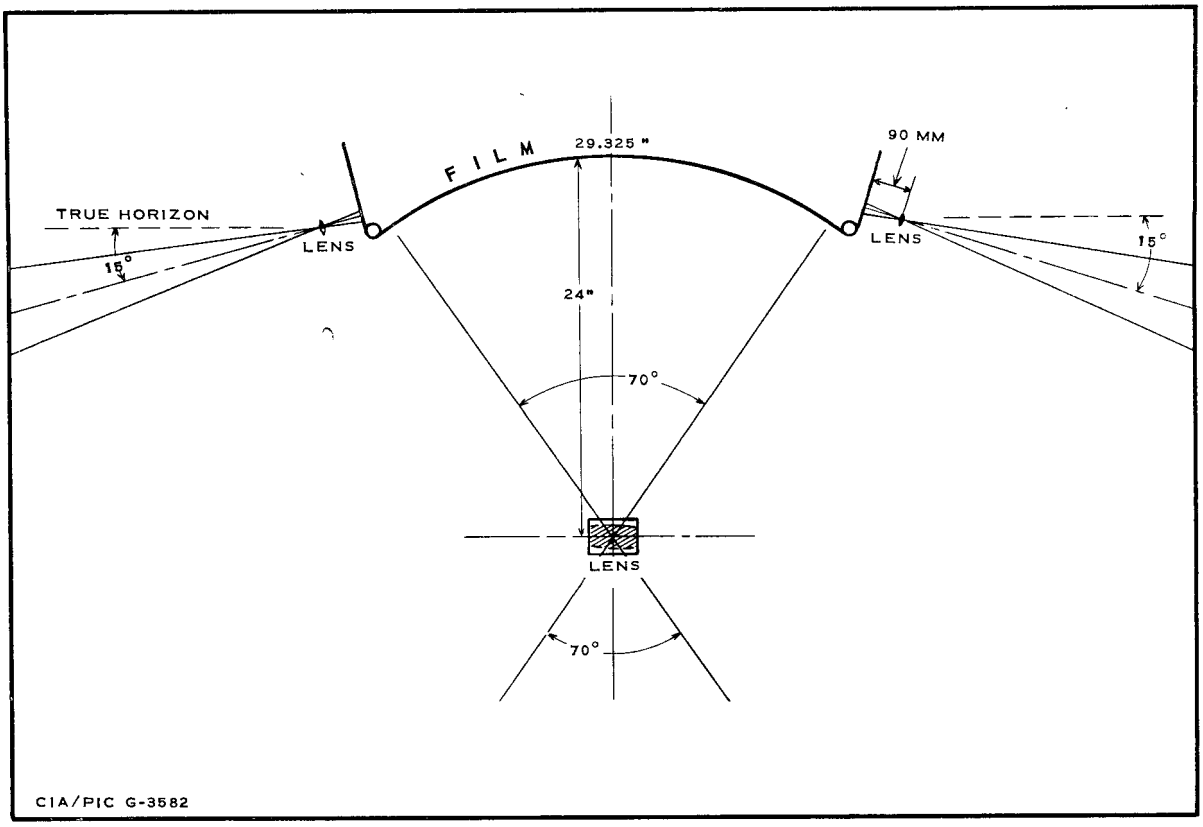

FIGURE 2. CAMERA GEOMETRY

4. Image Motion Compensation

Forward motion compensation is accomplished mechanically during the scan by causing the lens system to move opposite to the direction of flight during the scan and returning for the next cycle.

The camera drive mechanism is such that there is a fixed mechanical relationship between the forward motion compensation, the cycling rate, and the scanning rate.

The relationship between the forward motion compensation and the cycling rate has been established for a 10% overlap condition at the nadir.

Camera cycle time	2.402 seconds

Scan rate (constant) 71.628 inches/second

IMC rate (parallel to flight direction) in inches/second = .787 Cos θ

where θ is the displacement (expressed in degrees of arc) normal to the flight direction.

For example, θ will be zero degrees at the nadir and 35° at either end of the format.

5. Filter and Exposure Data

A. Main lens -- filter, Wratten 21; aperture, f/5; exposure, 1/1,000 second.

B. Horizon lenses -- filter, Wratten 25; aperture, f/8; exposure, 1/200 second.

6. Resolution Capabilities

A. Main lens -- at zero degrees, 100 lines per mm; at 18°, 97 lines per mm.

B. Port horizon lens -- at zero degrees, 51 lines per mm; at 7.5°, 39 lines per mm; at 15°, 37 lines per mm.

C. Starboard horizon lens -- at zero degrees, 44 lines per mm; at 7.5°, 39 lines per mm; at 15°, 34 lines per mm.

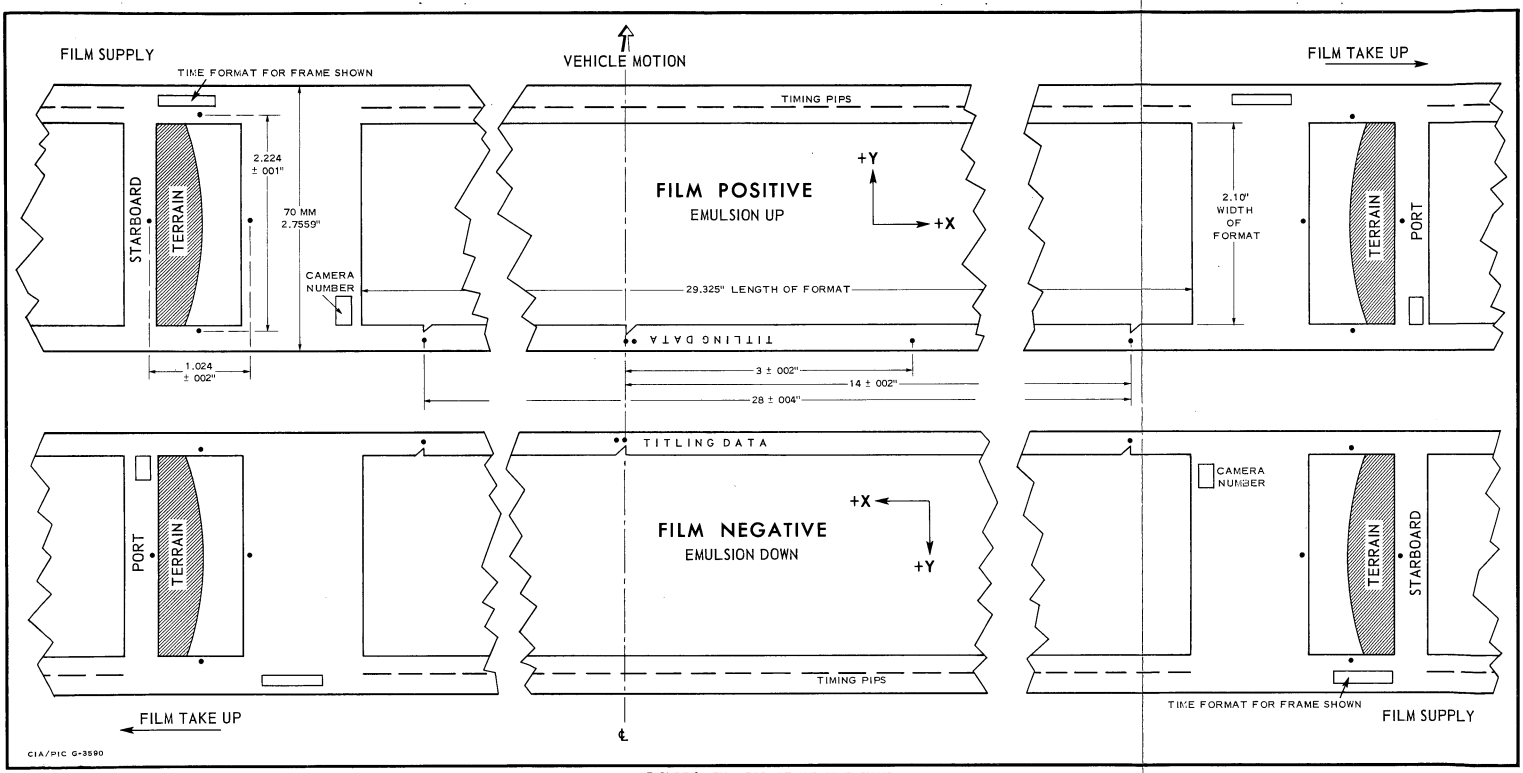

FIGURE 3. FILM FORMAT AND DIMENSIONS

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